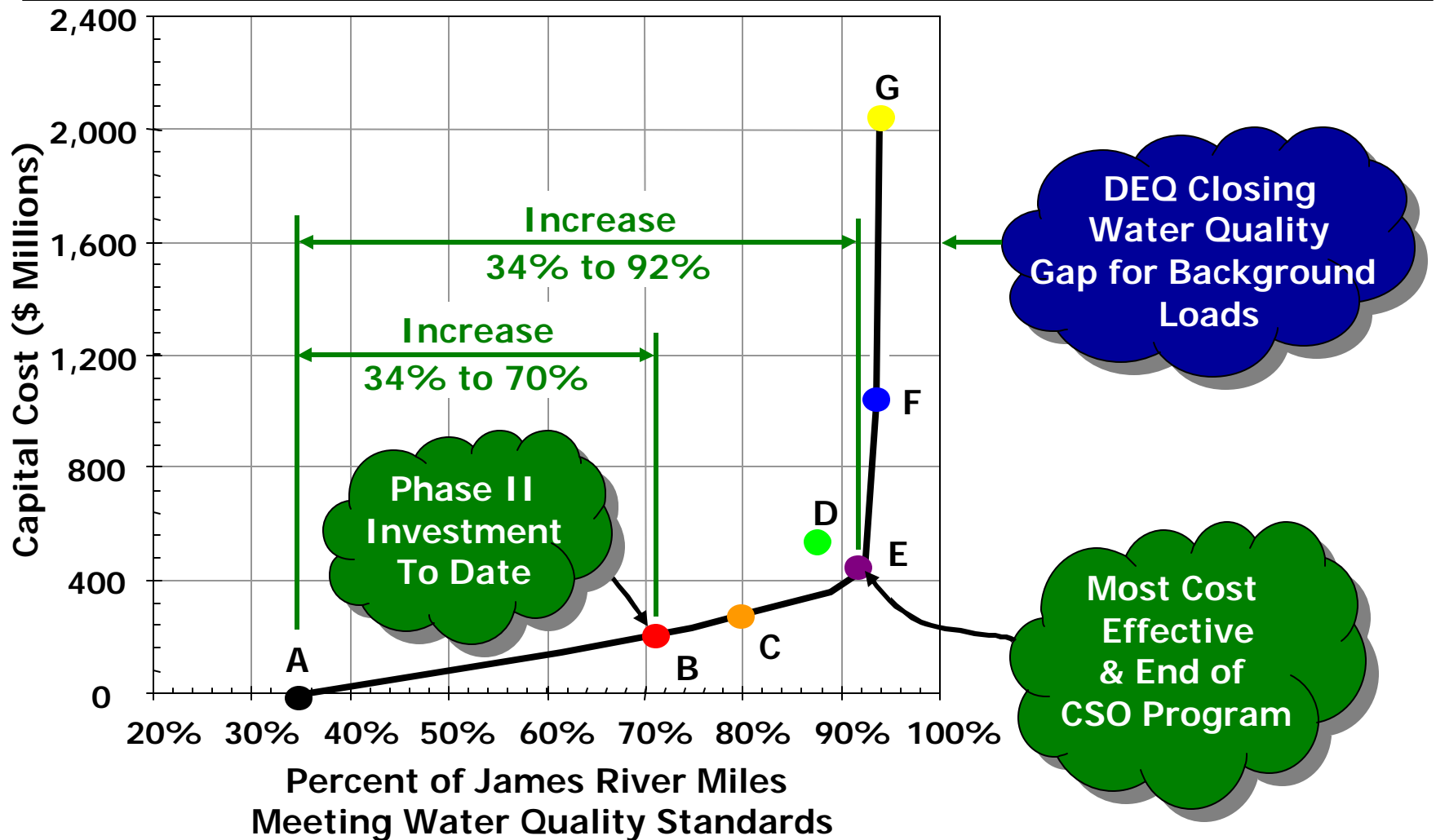




Water Quality Standards Coordination

Percent of James River Miles Meeting Fecal Coliform WQS

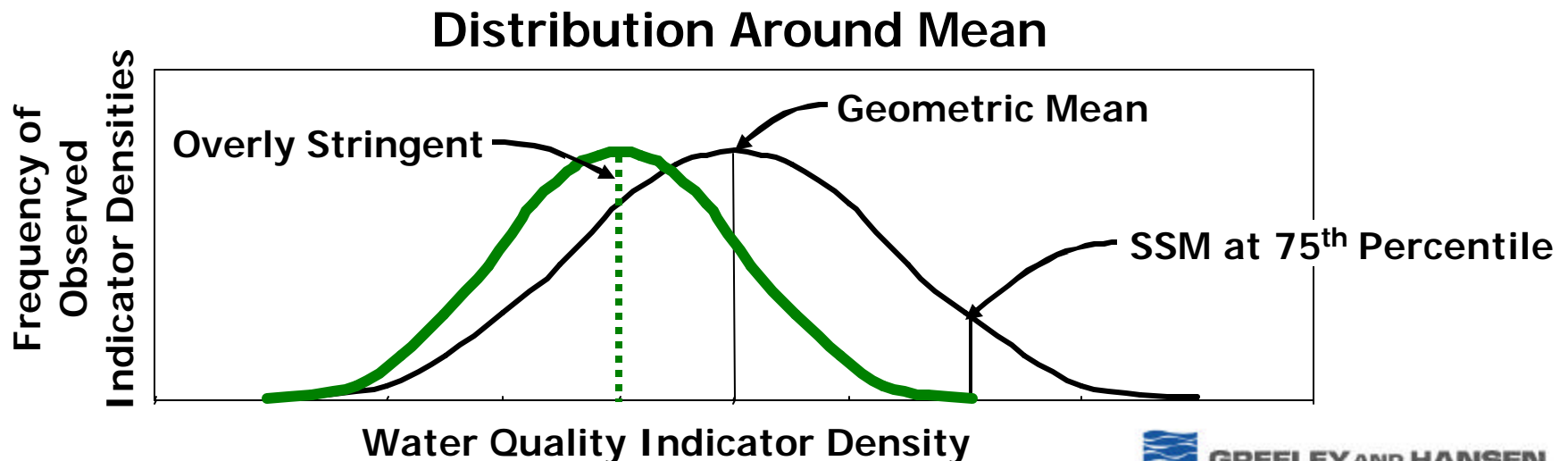




Water Quality Standards for Coastal and Great Lakes Recreation Waters; Final Rule (Beach Act 11/16/2004)

"3. Use of the Single Sample Maximum"

"Based on the derivation of the single sample maximums as percentiles of a distribution around the geometric mean, using the single sample maximums as values not to be surpassed for all Clean Water Act applications, even when the data set is large, could impart a level of protection much more stringent than intended by the 1986 bacteria criteria document."





Water Quality Model Output: Alternative E

E-Coli - Monthly Geometric Mean (#/100ml)																					
Year	Month	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
		98.9	97.8	96.8	95.8	94.8	93.8	92.8	91.8	90.8	89.8	88.8	87.8	86.8	85.8	84.8	83.8	82.8	81.8	80.8	79.8
Avg 74-78	Jan	56	66	69	68	66	66	73	79	80	78	77	75	73	71	68	65	63	60	58	57
	Feb	53	58	60	59	58	58	62	65	65	63	62	61	60	59	57	55	53	52	50	48
	Mar	56	64	67	66	64	66	74	80	82	80	78	77	76	74	72	69	67	65	63	62
	April	87	91	93	92	89	89	93	98	98	95	94	92	91	89	87	85	83	80	79	77
	May	124	137	145	145	142	143	155	167	168	162	156	149	142	134	125	117	110	104	99	95
	June	113	123	129	128	125	126	135	145	146	141	135	129	124	118	111	106	100	94	90	87
	Jul	112	124	130	126	118	119	131	142	141	132	122	113	105	97	87	79	73	67	64	61
	Aug	160	182	193	189	178	177	189	201	199	188	174	161	151	140	129	118	109	102	97	92
	Sept	74	83	87	84	80	83	94	104	105	98	92	87	84	78	72	66	61	59	57	55
	Oct	80	89	92	89	82	81	87	94	92	87	81	75	72	66	60	55	51	48	46	45
	Nov	83	91	94	89	82	81	87	92	91	84	78	72	67	62	57	52	48	45	43	42
	Dec	72	86	95	96	94	96	106	115	117	114	111	108	106	102	97	92	87	82	78	75

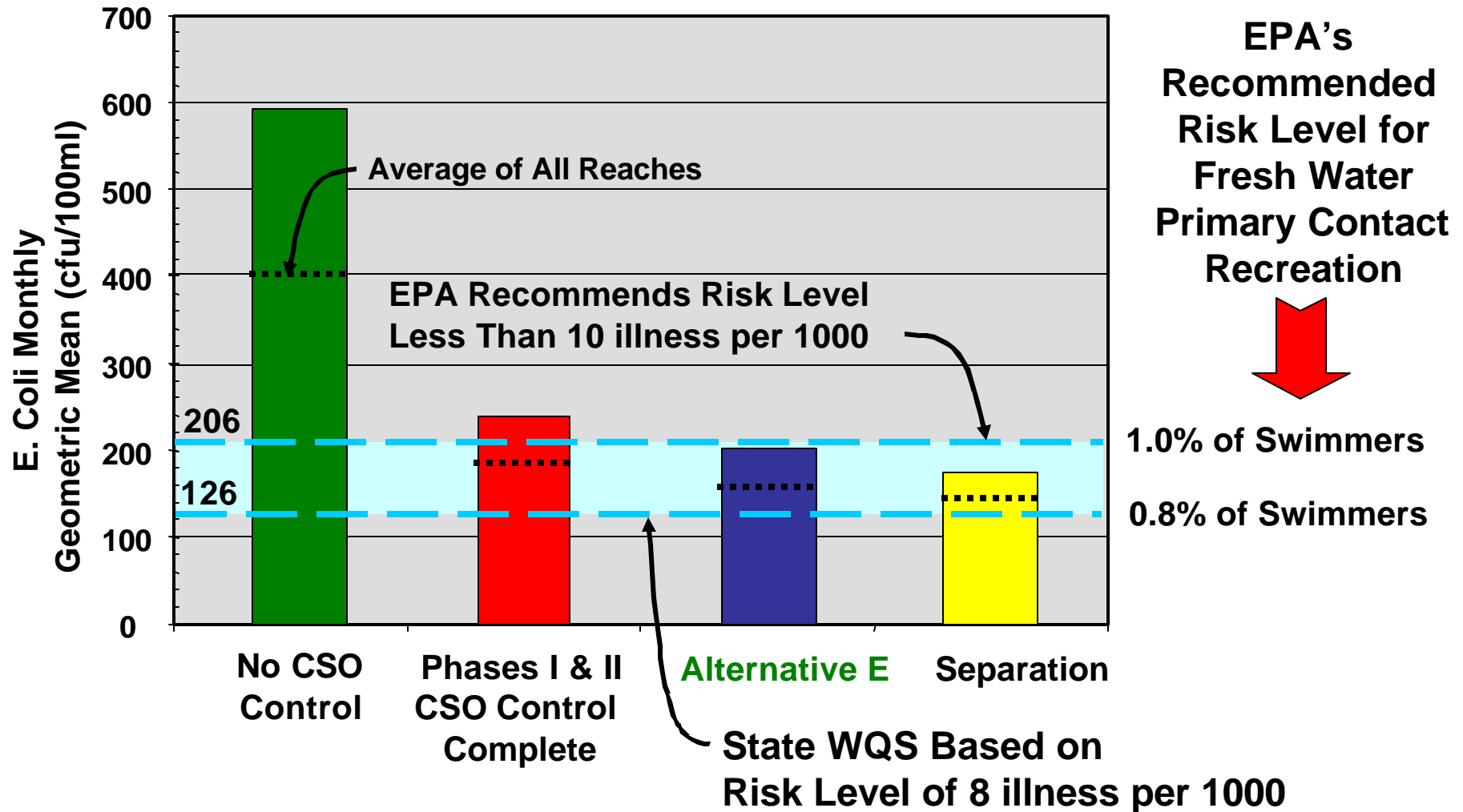
Illness Rate per 1,000 Swimmers based on E-Coli - Monthly Geometric Mean																					
Year	Month	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
		98.9	97.8	96.8	95.8	94.8	93.8	92.8	91.8	90.8	89.8	88.8	87.8	86.8	85.8	84.8	83.8	82.8	81.8	80.8	79.8
Avg 74-78	Jan	4.7	5.3	5.6	5.5	5.4	5.4	5.8	6.1	6.2	6.1	6.0	5.9	5.8	5.7	5.5	5.3	5.1	5.0	4.8	4.7
	Feb	4.5	4.8	5.0	4.9	4.8	4.9	5.1	5.3	5.3	5.2	5.1	5.1	5.0	4.9	4.8	4.6	4.5	4.4	4.2	4.1
	Mar	4.7	5.2	5.4	5.4	5.3	5.4	5.8	6.2	6.2	6.1	6.0	6.0	5.9	5.8	5.7	5.6	5.4	5.3	5.2	5.1
	April	6.5	6.7	6.8	6.7	6.6	6.6	6.8	7.0	7.0	6.9	6.8	6.7	6.7	6.6	6.5	6.4	6.3	6.2	6.1	6.0
	May	7.9	8.3	8.6	8.6	8.5	8.5	8.9	9.2	9.2	9.0	8.9	8.7	8.5	8.3	8.0	7.7	7.5	7.2	7.0	6.8
	June	7.6	7.9	8.1	8.1	8.0	8.0	8.3	8.6	8.6	8.5	8.3	8.1	7.9	7.7	7.5	7.3	7.0	6.8	6.7	6.5
	Jul	7.5	8.0	8.1	8.0	7.7	7.8	8.2	8.5	8.5	8.2	7.9	7.6	7.3	6.9	6.5	6.1	5.8	5.4	5.2	5.0
	Aug	9.0	9.5	9.8	9.7	9.4	9.4	9.7	9.9	9.9	9.6	9.3	9.0	8.8	8.4	8.1	7.7	7.4	7.2	6.9	6.7
	Sept	5.8	6.3	6.5	6.3	6.1	6.3	6.8	7.2	7.2	7.0	6.7	6.5	6.3	6.0	5.7	5.4	5.1	4.9	4.8	4.6
	Oct	6.2	6.6	6.7	6.6	6.3	6.2	6.5	6.8	6.7	6.5	6.2	5.9	5.7	5.4	5.0	4.7	4.3	4.1	3.9	3.8
	Nov	6.3	6.7	6.8	6.6	6.3	6.2	6.5	6.7	6.7	6.4	6.0	5.7	5.4	5.1	4.7	4.4	4.1	3.8	3.6	3.5
	Dec	5.7	6.4	6.8	6.9	6.8	6.9	7.3	7.6	7.7	7.6	7.5	7.4	7.3	7.2	7.0	6.7	6.5	6.3	6.1	5.9





Richmond CSO Control Program

Geometric Mean & Associated Risk Level
Maximum Month (August) for Reach 13

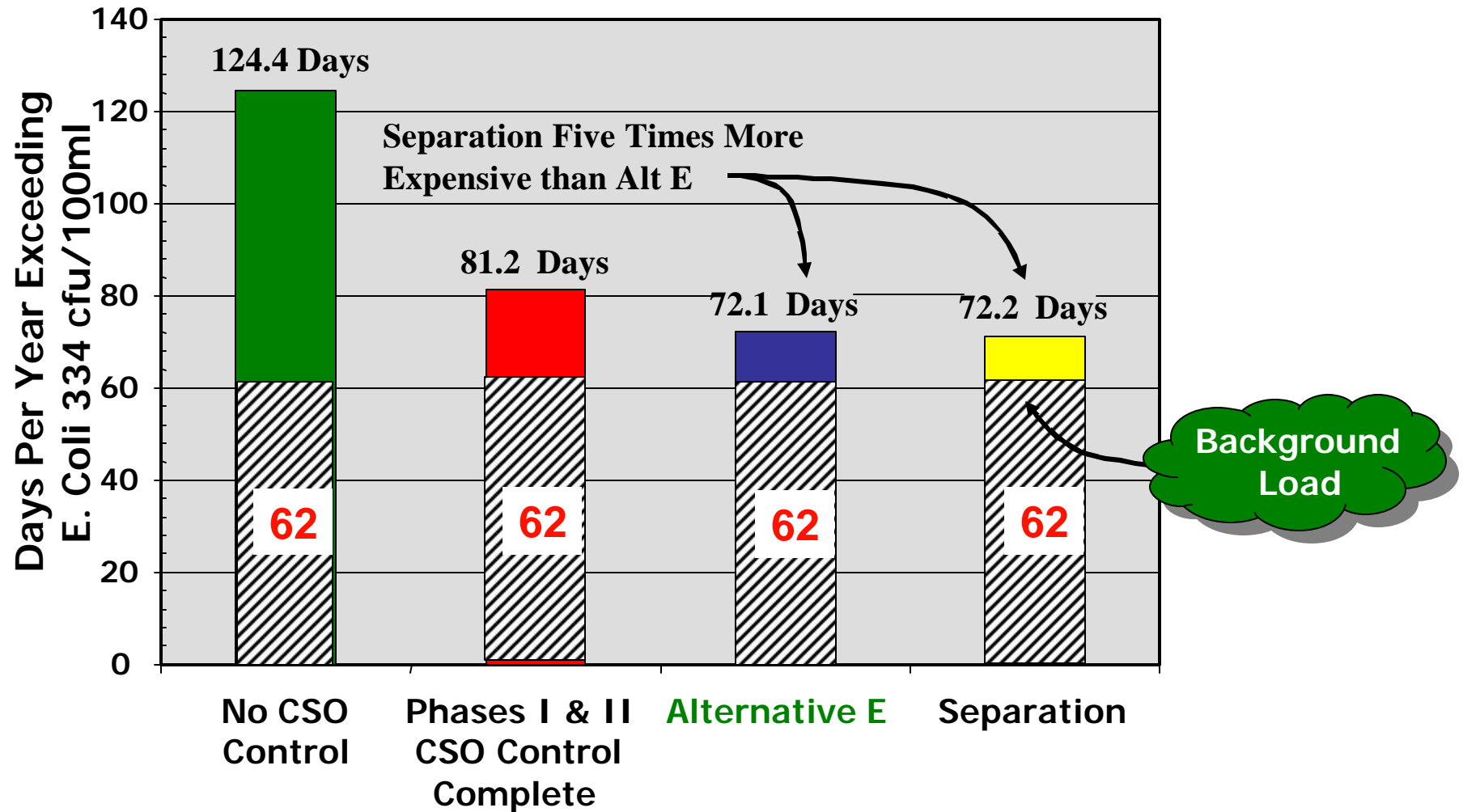




Richmond CSO Control Program

Average of River Reaches

Days Per Year Exceeding E. Coli 75th Upper Percentile Value



GREELEY AND HANSEN



Richmond Area James River Bacterial TMDL

Wet Weather Issues

1. Use of Single Sample Maximum (*From EPA Beach Act 2004*)
 - “EPA recognizes that the **single sample maximum** discussion in the 1986 bacteria criteria document **refers only to beach monitoring**, and does not discuss how or whether the single sample maximum should be implemented for other Clean Water Act applications, such as establishing Total Maximum Daily Loads or National Pollutant Discharge Elimination System permit limitations.”
 - “Other than in the beach notification and closure decision context, **the geometric mean is the more relevant value for ensuring that appropriate actions are taken to protect and improve water quality because it is a more reliable measure, being less subject to random variation, and more directly linked to the underlying studies on which the 1986 bacteria criteria were based.**”
2. EPA Established Freshwater Risk Levels (i.e. 8, 9 and 10 illnesses per 1,000 swimmers)
 - Freshwater Inconsistent with Risk Level for Coastal Beaches at 19 illness per 1,000 swimmers
3. If 1. & 2. above are not Addressed before setting WLAs, the TMDL may not be achievable
 - Timing Issue with Triennial Review

